Biology: Mercury Cycles

Read the following article "Mercury's toll on nature." Based on the information in the article, draw a diagram that illustrates how mercury cycles through the environment and through living organisms. Use a separate piece of paper and include and label the four steps listed in the article. Please do not write on the article.

Mercury's toll on nature

by Lori Haugen,
MaineToday.com

Mercury moves through the air, land and water in complex geochemical cycles that scientists are just beginning to understand. It may be able to circle the globe as a vapor, until it acquires an electrical charge and is attracted to dust, rain or snow and falls to the earth. Researchers estimate that global deposits of atmospheric mercury to the earth are increasing at a rate of 1 percent a year.

1. Depositing: Rain or snow washes mercury out of the atmosphere and deposits it on the land or in lakes and rivers.

2. Cycling back: Some of this mercury cycles back into the atmosphere from evaporation or forest fires and other disturbances.

3. Increased toxicity: In lakes and ponds, bacteria convert inorganic, elemental mercury to methylmercury, an organic form that is much more toxic to living beings - including humans. Lakes that are highly acidic, warmer and higher in dissolved organic carbon seem to produce more methylmercury.

4. Enters food chain: Methylmercury enters the food chain, perhaps through the consumption of bacteria or plankton. As these tiny organisms are eaten by larger ones, the methylmercury biomagnifies, or becomes more concentrated. The levels increase with each step up the chain, through insects, amphibians, fish and ultimately, humans.

Mercury is a basic chemical element and the only metal that exists in a liquid state at room temperatures. It enters the environment naturally from volcanoes, mineral deposits and evaporation from the oceans.

Human activities like waste incineration, coal burning and chlorine production have doubled or tripled natural mercury levels in the atmosphere. Each year, the atmospheric concentration of mercury increases by one to two percent.

Some of the mercury released by power plants or factories falls to the ground relatively close to the source. Some of it remains in the atmosphere as a vapor and drifts for some distance on the prevailing winds. In the United States, mercury levels generally increase from the west to east coasts, reflecting the flow of wind over the continent.

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In fish, mercury concentrates in the muscle tissue and builds up as the fish gets older and larger. The highest mercury levels tend to be found in warm-water species, like bass or perch. Unlike such toxic contaminants as dioxin or PCBs, which concentrate in the skin or fat, mercury cannot be cooked out or cut out of a fish before it is eaten.

When humans eat contaminated fish, the mercury moves quickly through the stomach and intestines. It readily crosses the blood stream to the brain, where it attacks the central nervous system. In pregnant women, mercury crosses the placenta and enters the fetus. Exposure is more dangerous for children, because more of the mercury passes into their brains.

The human health effects of exposure to mercury from eating contaminated fish may include: - irritability - shyness - tremors - tunnel vision - reduced hearing - poor memory - difficulty chewing and swallowing.

Humans eliminate mercury through the urine and feces. However, it may take months for the body to purge itself after mercury consumption is halted. That means a woman who becomes pregnant may pass mercury on to her unborn child during a critical period of fetal development, even if she hasn't eaten fish for months.